

REMARKS

Claims 1-30 are pending in the application. Claims 12-20, 29 and 30 have been withdrawn from consideration in the instant application. Claims 1 and 8 have been amended without intending to narrow their scope. Favorable consideration is respectfully requested in light of the following remarks.

Restriction Requirement

Claims 12-20, 29 and 30 stand withdrawn from consideration as being directed to a non-elected invention. For the reasons discussed in the Amendment After Final Rejection filed on November 30, 2005, Claims 12-16 and 29, and Claims 17-20 and 30, respectively, should be rejoined with the elected subject matter once Claims 1 and 8, respectively, have been found to be allowable.

Objections to Claims

Claims 1 and 8 have been amended to recite the term "respectively" as suggested in the Official Action. Withdrawn Claims 16 and 17 now have the proper status identifier. Withdrawal of the objections is respectfully requested.

First Rejection Under 35 U.S.C. § 103

Claims 1-7, 21, 22, 25, 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,320,736 to Shamouilian et al. ("Shamouilian") in view of U.S. Patent No. 5,439,026 to Moriya et al ("Moriya") and U.S. Patent No. 6,254,683 to Matsuda et al. ("Matsuda"). The reasons for the rejection are stated on pages 4-7 of the Official Action. The rejection is respectfully traversed.

Claim 1, as amended, recites a multiple zone gas distribution apparatus for controlling temperature across a workpiece during processing. The apparatus comprises, *inter alia*, the features of inner and outer zone bleed lines connected to the respective inner and outer zone feed lines respectively between the pressure and flow control system and the chuck. The inner zone bleed line has a connecting line in fluid connection with the outer zone bleed line and a fixed orifice adapted to continuously bleed the pressure of the inner zone to the outer zone bleed line during processing of the workpiece. The inner zone bleed line has an evacuation valve adapted to bypass the fixed orifice for immediate inner zone evacuation, and the outer zone bleed line has an evacuation valve for pressure release.

The Official Action acknowledges that Shamouilian does not teach a "fixed orifice adapted to continuously bleed the pressure of inner zone and an evacuation valve adapted to bypass the fixed orifice." However, the Official Action asserts that Moriya teaches a gas flow apparatus for semiconductor wafer processing that includes a straightening vane 43 ("fixed orifice 43") in the gas flow path 33 to ensure flow of gas at a predetermined flow rate. The Official Action contends that it would have been obvious to add Moriya's "fixed orifice 43" in the inner zone bleed line along the "connecting line" in Shamouilian's apparatus.

The Official Action further asserts that Matsuda teaches an apparatus having an evacuation line 19 with a cut-off valve 41 ("evacuation valve") that bypasses the by-pass line 17a. The Official Action further asserts that it would have been obvious to use an evacuation valve in an inner zone bleed line that bypasses a fixed orifice in the apparatus of Shamouilian in view of Moriya to reduce evacuation time.

Applicants respectfully disagree.

The gas distribution apparatus recited in Claim 1 comprises an inner zone bleed line having a connecting line in fluid connection with the outer zone bleed line and a fixed orifice. The fixed orifice is adapted to continuously bleed the pressure of the inner zone during processing of a workpiece. The fixed orifice prevents excess pressure from the inner zone migrating to the outer zone, allowing control of the outer zone pressure. See paragraph [0018] of the present specification. As recited in Claim 1, the inner zone bleed line has an evacuation valve adapted to bypass the fixed orifice for immediate inner zone evacuation. In the exemplary embodiment of the gas distribution apparatus shown in FIG. 1, the inner zone bleed line 52 includes a connecting line 68 in fluid connection with the outer zone bleed line 54 and a fixed orifice 60. An evacuation valve 66 is arranged along the inner zone bleed line 52. The fixed orifice 60 allows pressure in the inner zone to be continuously bled to the outer zone bleed line via the connecting line 68 during processing of a workpiece held on the chuck. The evacuation valve 66 allows the fixed orifice 60 (and the outer zone bleed line 54) to be bypassed for immediate inner zone evacuation.

Shamouilian discloses a chuck and a gas supply system for supplying heat transfer gas to a chuck. Fig. 5 of Shamouilian shows a gas supply system including a heat transfer gas source 59, a flow control system 55, and gas inlet lines 50a, 50b, which supply gas to inlet ports 40a, 40b. Bypass valves 76a, 76b and valve 72 are in fluid connection with the gas inlet lines 50a, 50b. Valve 72 is normally closed. See column 7, lines 20-42, of Shamouilian.

Applicants respectfully submit that the Official Action has not established the required motivation for the proposed modification of Shamouilian's system. To establish *prima facie* obviousness of claimed subject matter based on a combination of references, there must be a reason, suggestion or motivation to lead an inventor

to combine the references. *ACS Hosp. Sys. Inc. v. Montfiore Hosp.*, 221 USPQ 929, 933 (Fed. Cir. 1984). The suggestion or motivation may come expressly from the references themselves. *In re Sernaker*, 217 USPQ 1, 5 (Fed. Cir. 1983). Motivation may also come from knowledge of those skilled in the art, or from the nature of the problem to be solved. *Pro-Mold and Tool Co. v. Great Lakes Plastics, Inc.*, 37 USPQ2d 1626, 1630 (Fed. Cir. 1996). The Official Action has not established motivation from any one of these three sources for the asserted modification of Shamouilian's apparatus.

Also, the mere fact that a reference may be modified does not make the resultant modification obvious unless the art suggested the desirability of the modification. *In re Fritch*, 23 USPQ2d 1780, 1783-84, n. 14 (Fed. Cir. 1992); *In re Gordon*, 221 USPQ 1125, 1127 (Fed. Cir. 1984); *In re Kotzab*, 55 USPQ2d 1313, 1316-17 (Fed. Cir. 2000); MPEP § 2143.01(I). The Official Action also has not established that the applied references suggested the desirability of the asserted modification of Shamouilian's apparatus.

Applicants submit that the Official Action has not established motivation for modifying Shamouilian's system to include the combination of features recited in Claim 1, including an inner zone bleed line having a connecting line in fluid connection with an outer zone bleed line and a fixed orifice adapted to continuously bleed the pressure of the inner zone to the outer zone bleed line during processing of the workpiece, and wherein the inner zone bleed line has an evacuation valve adapted to bypass the fixed orifice for immediate inner zone evacuation.

Firstly, the Official Action has not identified the specific location of the alleged connecting line in Shamouilian's system. Accordingly, Applicants are unable to

determine what particular portion of Shamouilian's system is being modified in the Official Action.

Secondly, the Official Action has not established a reason or motivation to continuously bleed pressure from Shamouilian's "inner zone bleed line" with bypass valve 76b to the "outer zone bleed line" with bypass valve 76a. As discussed above, in the claimed apparatus, the fixed orifice prevents excess pressure from the inner zone migrating to the outer zone, allowing control of the outer zone pressure. However, there is no recognition of this problem in Shamouilian or in Moriya or Matsuda. As such, one having ordinary skill in the art would not have been motivated by the applied combination of references to modify Shamouilian's system to include the features of an inner zone bleed line having a connecting line in fluid connection with an outer zone bleed line and a fixed orifice adapted to continuously bleed the pressure of the inner zone to the outer zone bleed line during processing of the workpiece.

Furthermore, Shamouilian discloses that valve 72 is normally closed. As such, Shamouilian does not suggest continuously bleeding the line along which the bypass valve 76b is located, or the line along which bypass valve 76a is located, because the normally closed valve 72 would prevent such continuous bleeding of both lines. Accordingly, the Official Action has not established that it would have been desirable to modify Shamouilian's apparatus to include the claimed fixed orifice.

Shamouilian's apparatus includes the bypass valve 76b along the "inner zone bleed line." Matsuda does not suggest modifying Shamouilian's apparatus to include an additional bypass line and an evacuation valve in the "inner zone bleed line." For

at least the foregoing reasons, the applied combination of references does not suggest the combination of features recited in Claim 1, which is patentable.

Claims 2-7, 21, 22, 25 and 26, which depend from Claim 1, are also patentable over the applied combination of references for at least the same reasons as those for which Claim 1 is patentable. Therefore, withdrawal of the rejection is respectfully requested.

Second Rejection Under 35 U.S.C. § 103

Claims 8-11, 23, 24, 27 and 28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Shamouilian in view of Moriya and Matsuda, and further in view of JP 10163308 A to Ito et al. ("Ito"). The reasons for the rejection are stated on pages 7-11 of the Official Action. The rejection is respectfully traversed.

Claim 8, as amended, recites an apparatus for detecting dechucking in a multiple zone wafer cooling system, which comprises, *inter alia*, the features of first and second zone bleed lines connected to the respective first and second zone feed lines between the pressure and flow control system and the chuck. The first zone bleed line has a connecting line in fluid connection with the second zone bleed line and a fixed orifice adapted to continuously bleed the pressure of the first zone to the second zone bleed line during processing of the workpiece. The first zone bleed line has an evacuation valve which is adapted to bypass the fixed orifice for immediate first zone evacuation. The pressure and flow control system provides a signal indicating dechucking when the flow rate of the coolant gas increases more than a predetermined amount.

For reasons discussed above, Shamouilian, Moriya and Matsuda fail to suggest at least the features of a first zone bleed line having a connecting line in fluid

connection with a second zone bleed line and a fixed orifice adapted to continuously bleed the pressure of the first zone to the second zone bleed line during processing of a workpiece, wherein the first zone bleed line has an evacuation valve adapted to bypass the fixed orifice for immediate first zone evacuation, as recited in Claim 8. Applicants submit that JP '308 also fails to suggest modifying Shamouilian's apparatus to include these claimed features.

Claim 8 also recites the features of the pressure and flow control system provides a signal indicating dechucking when the flow rate of the coolant gas increases more than a predetermined amount. As described at paragraph [0027] of the present specification, accurately detecting dechucking prevents damage to wafers, which occurs when wafers are lifted prior to dechucking. JP '308 does not disclose or suggest a pressure and flow control system that provides a signal indicating dechucking when a gas flow rate increases more than a predetermined amount. The JP '308 apparatus monitors the difference between electrostatic attraction on the wafer and back pressure on the wafer, and maintains this difference at a set value during processing to avoid floating of the wafer. If the difference varies from the set value during processing, JP '308 changes the electrostatic attraction to reduce the deviation to zero to avoid floating of the wafer. See the Abstract.

As also described at paragraph [0027] of the present specification, the fixed orifice of the first zone bleed line allows continuous bleeding of the first zone and prevents migration of excess pressure from the first zone to the second zone, which can distort any possible sudden pressure change that would indicate dechucking. The applied combination of references does not suggest modifying Shamouilian's apparatus to include a fixed orifice along such first zone bleed line to address this

problem addressed by the claimed fixed orifice. Thus, Claim 8 is patentable over the applied combination of references.

Claims 9-11, 23, 24, 27 and 28, which depend from Claim 8, are also patentable over the applied combination of references for at least the same reasons as those for which Claim 8 is patentable. Therefore, withdrawal of the rejection is respectfully requested.

Conclusion

For the foregoing reasons, allowance of the application is respectfully requested. If there are any questions concerning this response, to expedite prosecution, the Examiner is respectfully requested to contact the undersigned at the number given below.

Respectfully submitted,

BUCHANAN INGERSOLL PC
(INCLUDING ATTORNEYS FROM BURNS DOANE SWECKER & MATHIS)

Date: June 6, 2006

By: 

Edward A. Brown
Registration No. 35,033

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620